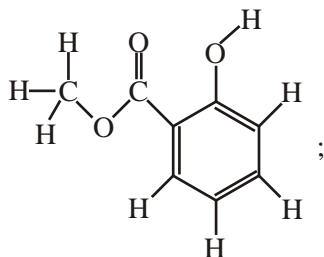


T10D11 – SL Organic Review MS

1. (i) C_4H_{10} : non-polar, only van der Waals' forces that cannot replace/interact with H-bonding in water;
 C_2H_5Cl : only slightly polar/not capable of H-bonding with water; 2
- (ii) $(CH_3)_2CO$: highly polar/forms H-bonding with water;
 C_3H_7OH : forms H-bonding with water (as H is bonded to O); 2

[4]

2. (i) (Empirical formula =) $C_8H_8O_3$;



Allow double bonds on arene in alternate positions, or allow delocalized representation (of pi electrons).

2

- (ii) the bond at 0.1373 nm is a double bond **and** the bond at 0.1424 nm is a single bond;
 in $CO_2(g)$ both bonds are double bonds **and** would have a value around 0.137 nm;

2

- (iii) Ester;
 Arene/benzene ring;
 Alcohol;

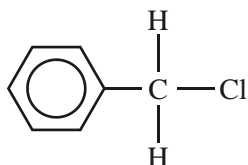
2

Award 2 for any three correct, award [1] for any two correct.

Do not accept alkane as a type of functional group in this molecule.

[6]

3. (a) 1



- (b) $Cl_2 \rightarrow 2Cl\bullet$ initiation;
 $Cl\bullet + C_6H_5CH_3 \rightarrow C_6H_5CH_2\bullet + HCl$ propagation;
 $C_6H_5CH_2\bullet + Cl_2 \rightarrow C_6H_5CH_2Cl + Cl\bullet$ propagation;
 any correct termination equation termination

5

Award [1] for each correct equation.

Award [1] for correct naming throughout.

Ignore "curly arrows".

- (c) breaks $Cl-Cl$ bond homolytically/produce free radicals; 1

[7]

4. (a) a hydrocarbon that contains at least one C=C (or C \equiv C)/carbon-carbon double bond (or triple bond)/carbon to carbon multiple bond; 1
Do not accept just "double bond".
- (b) $C_2H_4 + H_2O \rightarrow C_2H_5OH$; 2
 addition/hydration reaction;
- (c) heat under reflux; 4
 EITHER
 potassium dichromate(VI)/ $K_2Cr_2O_7$ / $Cr_2O_7^{2-}$ and acidified/ H^+ ;
 orange to green;
 OR
 potassium permanganate/manganate(VII)/ $KMnO_4$ / MnO_4^- and acidified/ H^+ ;
 purple to colourless;
Penalize wrong oxidation state, but not missing oxidation state.
 ethanoic acid;
- (d) $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOCH_2CH_3 + H_2O$; 4
accept equations including H^+ .
Reversible arrow not required for the mark.
 sulfuric acid/ H_2SO_4 /(ortho)phosphoric acid/ H_3PO_4 ;
 Z – ethyl ethanoate;
 solvent/flavouring/perfumes/plasticizers;
5. (a) S_N2 / bimolecular; 1
- (b) (i) reaction slower; 2
 neutral/uncharged/less polar/electrons donated less easily in H_2O ;
- (ii) reaction faster; 2
 less bulky group/reduced steric hindrance;
6. (i) A. = $CH_3(CH_2)_7CHO$; 5
 B. = $CH_3(CH_2)_7COOH/CH_3(CH_2)_7CO_2H$;
 C. = $(CH_3)_3COH$;
 D. = $(CH_3)_2CO$;
 E. = $BrCH_2CH_2Br$;
Allow correct structural formulas.
- (ii) addition; 2
- $$\begin{array}{ccccccc}
 H & H & H & H & H & H \\
 | & | & | & | & | & | \\
 -C & -C & -C & -C & -C & -C- \\
 | & | & | & | & | & | \\
 H & H & H & H & H & H
 \end{array}
 \begin{array}{l}
 /-(CH_2-CH_2)_3- \\
 /-(CH_2)_6-
 \end{array}$$

[11]

[5]

[7]